

REMARKS

This application has been carefully reviewed in light of the Office Action mailed on September 20, 2002. The Title of the Invention has been amended. Attached hereto is a marked-up version of the changes made to the Title on a page captioned "Version with markings to show changes made." Claims 1-14 are pending in this application.

The Title of the Invention is objected to as being "non-descriptive." As requested by the Examiner, Applicant has amended the title as shown above. Please note that the Applicant's proposed title is slightly different from the replacement title suggested by the Examiner, but one which the Applicant feels more accurately reflects his invention.

The Office Action states that the application has been filed with informal drawings. Reconsideration is requested. This application is the national stage of International Application No. PCT/EP99/07957, which has been submitted to the PTO. The drawings submitted with the International Application (Figures 1, 2a-c, and 3-5) are believed to be formal drawings and in full compliance with 37 C.F.R. § 1.84.

Claims 1-14 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,678,991 (Schmidt) in view of U.S. Patent No. 4,140,998 (Bettle). Reconsideration is respectfully requested for the following reasons.

Claim 1 recites a linear inductive transducer comprising a "first primary winding, and a pair of secondary windings, [and] a second primary winding." Further, claim 1 recites an "electric signal including a first and a second component, indicative of the mutual position between [a] magnetic core and [the] primary windings and [the]

secondary windings, respectively.” These are important features of the present invention because, for example, they allow to achieve in an extremely flexible way the desired sensitivity and output impedance of the linear inductive transducer (see e.g., the specification at page 7, lines 25-32 and page 8, lines 18-35).

Schmidt discloses an inductive displacement transducer, e.g. of the linear variable differential transformer (LVDT) kind, including a single primary winding (P), two series opposed secondary windings (S_1) and (S_2) connected to the primary winding (P), and a magnetic core 48 linearly movable between the primary and the secondary windings. The particular connection of the single primary to the secondary windings allows to get an output signal that:

- has a constant component, corresponding to the excitation signal, V_{EXC} , (column 4, lines 49-54); and
- is unipolar (column 2, lines 11-14), thus rendering the transducer suitable to particular applications such as in avionic or electronic engine control equipment.

Bettle discloses a position indicator with an inductive transducer and circuits for compensating for possible amplitude and frequency variations of the excitation signal.

Applicant wishes to point out that, even though Bettle improperly uses the term “Linear Variable Differential Transformer” (LVDT) (see, e.g., the abstract of Bettle), it is evident that the transducer that is shown and described is of the so-called “Half Bridge” type (“HBT,” see e.g., page 2, lines 24-31 of the specification of the present invention).

Significantly, the transducer of Bettle does not include any “secondary” windings in which

voltage is electromagnetically induced. In substance, Bettle just shows a Half Bridge Transducer and additional “accuracy assurance” circuits that have nothing to do with the present invention.

Initially, neither Schmidt nor Bettle, taken alone or in combination, teaches or suggests a transducer according to claim 1 wherein the output electric signal includes “a first and a second component, indicative of the mutual position between the magnetic core and [the] primary windings and [the] secondary windings, respectively” (emphasis added). Thus, in the transducer of claim 1, both components of the electric output signal (that is generally bipolar – see e.g., signal V_o in Figures 2a, 2b and 2c) vary as the position of the magnetic core changes. To the contrary, Bettle shows optional circuits (voltage divider network 22) providing output voltage levels, “compatible with the remainder of the position indicator circuitry” (column 3, lines 30-31), and Schmidt provides a unipolar output by shifting the variable voltage induced in the secondary windings by a constant amount (the excitation signal V_{exc} , as discussed above).

Neither reference teaches the above recited limitation of claim 1, as would be required to establish a prima facie case of obviousness under 35 U.S.C. § 103(a). For at least this reason claim 1 should be allowable over the cited references. Claims 2-7 depend from claim 1 and contain every limitation of claim. Claims 2-7 should be allowable for at least the reasons for allowance of claim 1, and also because the limitations recited by these dependent claims are neither taught nor suggested by the cited references.

Moreover, even assuming *arguendo* that Schmidt and Bettle teach all of the elements of claim 1, and they do not, the two references are not properly combinable as suggested in the Office Action. The Office Action asserts that it “would have been obvious ... to use the second primary winding disclosed by Bettle on the inductive displacement transducer disclosed by Schmidt for the purpose of providing an output voltage level on the output lead which is compatible with the remainder of the position indicator circuitry.”

Applicant respectfully disagrees. One skilled in the art would not lift a winding from Bettle and insert it into Schmidt simply for the purpose of making that winding “compatible with the remainder of [Schmidt’s] position indicator circuitry.” Nothing in Schmidt suggests employing a “second primary winding” in Schmidt’s device. Nothing in Bettle suggests adding “secondary windings” in its device, or to use the “two windings 11 and 12 series connected at a tap 13” in an actual transformer-like structure. Without hindsight benefit of the Applicant’s disclosure, it would not have been obvious to combine the references as suggested in the Office Action. This is another reason why claim 1 and claims 2-7 dependent therefrom are allowable over the cited references.

Claim 8 refers, for example, to the embodiment of Figures 3, 4 and 5, that is a transducer with a very flexible structure through which it is possible to select and attain in a quick and easy way different kinds of transducers, e.g., a transducer having the features of Figure 1 (and of claims 1-7), and also, alternatively, transducers of the HBT, or LVDT kinds (see the specification at page 10, lines 14-20). This offers substantial advantages for users, who can adapt the same “universal” transducer to the requirements of the particular application involved. (Please note that this has nothing to do – as far as construction,

operation and results are concerned – with the *voltage divider network 22* of Bettie, providing output voltage levels “compatible with the remainder of the position indicator circuitry.”)

Claim 8 recites a linear inductive transducer comprising a “first primary winding, and a pair of secondary windings, [and] a second primary winding.” As discussed above with respect to claim 1, Schmidt and Bettie are not properly combinable to render obvious these claim elements, and claim 8 should be allowable for at least this reason.

In addition, claim 8 recites a transducer having “three output terminals electrically connected to the ends of [a] pair of secondary windings, and to [a] connection point between the primary windings, respectively, the transducer being adapted for selectively providing [an] electric signal at one or a pair of [the] three output terminals” (emphasis added). Neither Schmidt nor Bettie, taken alone or combination, teaches or suggests this claim limitation, and the Office Action does not assert that the references teach or suggest this limitation. This is another reason why claim 8 should be allowable over the cited references.

Claims 9-14 depend from claim 8 and contain every limitation of claim 8. Claims 9-14 should be allowable for at least the same reasons as for allowance of claim 8, and also because the unique combinations recited in these dependent claims are neither taught nor suggested by the cited references.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue.

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Respectfully submitted,

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Version With Marketing to Show Changes Made

Title of the Invention

LINEAR [INDUCTIVE] POSITION TRANSDUCER WITH PRIMARY
AND SECONDARY WINDINGS AND A MOVABLE INDUCTION COUPLING
ELEMENT